

# PATENT ABSTRACTS OF JAPAN

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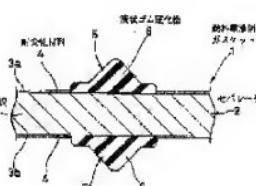
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## (54) GASKET FOR FUEL CELL

### (57)Abstract:

PROBLEM TO BE SOLVED: To provide a gasket for a fuel cell, in which a rubber piece is fixed tightly to a separator, without coating a binder on the separator, and then eliminating a process of coating the binder on the separator.

SOLUTION: The gasket for the fuel cell, in which a liquid rubber cured product 6 is formed without having to employ the binder to either both sides or one side of the separator in which a corrosion resistance material 4 is placed to a metal thin plate 3, is provided, in which no plating is applied to a place where the liquid rubber cured product 6 is formed, but the liquid rubber cured product 6 is directly formed on the metal thin plate 3.



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#### **DETAILED DESCRIPTION**

### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the gasket for fuel cells which makes the separator for fuel cells the part of a component.

[0002]

[Description of the Prior Art] In [ as shown in drawing 15, as the separator 51 for fuel cells, the metallic thin plates 52, carbon plates, etc., such as stainless steel, are used from the former, and ] the former metallic thin plate 52, So that contact resistance may not increase by generating of rust [ \*\*\*\* / plating the gold 53, in order to reduce the contact resistance ] in use, etc. Gold, plating anticorrosion metals or these alloys, such as titanium or molybdenum, \*\*\*\* – or a circumference -- dense carbon coating, for example, a carbon-shadowing film, is formed.

[0003]In order to secure the seal between the separator and ion-exchange membrane which adjoin the separator 51, it is necessary to fabricate the rubber 54 on the surface.

[0004]About shaping of the rubber 54 to the plated metallic-thin-plate 52 top. In the method of fixing the rubber 54 using the adhesives 55, especially double-sided shaping, as indicated to JP,8-162145,A, While applying adhesives on a separator as indicated to JP,11-179755,A, there is the method of making a through hole in a separator and fabricating rubber to the both sides.

[0005] However, in these methods, it is supposed that the bonding agent applying process to a separator is indispensable each, on the other hand the abbreviation is desired.

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[Problem(s) to be Solved by the Invention]It aims at providing the gasket for fuel cells which it can fix rubber to a separator even if this invention does not apply adhesives to the plated separator in view of the above point, and it has it, and can skip the bonding agent applying process to a separator.

[0007]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, a gasket for fuel cells by claim 1 of this invention, A liquid rubber hardened material was directly fabricated to a metallic thin plate, without plating in a part which is the gasket for fuel cells with which a liquid rubber hardened material was made to fabricate, without using adhesives for a separator which plated a corrosion-resistanting material to a metallic thin plate, and fabricates said liquid rubber hardened material.

[0008]In the above-mentioned gasket for fuel cells of claim 1, a gasket for fuel cells by claim 2 of this invention is characterized by surface roughness of a metallic-thin-plate portion which does not plate being 0.1 micrometer - 100 micrometers.

[0009]A gasket for fuel cells by claim 3 of this invention, It is the gasket for fuel cells with which a liquid rubber hardened material was made to fabricate without using adhesives for one side of a separator which plated a corrosion-resisting material to a metallic thin plate, An engagement part which consists of a through hole or a slot for preventing exfoliation of said liquid rubber hardened material, etc. was provided in said metallic thin plate.

[0010]In the above-mentioned gasket for fuel cells of claim 3, a gasket for fuel cells by claim 4 of this invention is characterized by surface roughness of an engagement part wall surface being 0.1 micrometer - 100 micrometers.

[0011] in a gasket by claim 1 of this invention provided with the above-mentioned composition, Since plating is not performed to a part which fabricates a liquid rubber hardened material in a plated metallic thin plate, a base material of a metallic thin plate which a base material of a metallic thin plate is exposed in this portion, and

consists of stainless steel etc. has coarse surface roughness as compared with plating. Therefore, in a portion which a metallic thin plate exposed, since surface roughness of a metallic thin plate is maintained as it is, the adhesive property of a metallic thin plate and a liquid rubber hardened material is raised and a position gap of a gasket does not arise, wearing nature is good and it becomes possible to raise the sealing nature of it. [0012]As indicated to claim 2, when it is preferred for surface roughness of a metallic-thin-plate portion which does not plate to be referred to as 0.1 micrometer - 100 micrometers, an adhesive property has a possibility of producing a problem when less than 0.1 micrometer and it exceeds 100 micrometers, there is a possibility that a metallic thin plate may become thick and may become excessive [ weight ]. Only a metallic-thin-plate portion which performs a metallic thin plate beforehand by surface roughening treatment, such as electrochemical processing, chemical preparation, a mechanical process, or physical processing, or does not plate performs formation of surface roughness of a metallic-thin-plate portion which does not plate.

[0013]In a gasket by claim 3 of this invention provided with the above-mentioned composition, Since an engagement part which becomes the plated metallic thin plate from a through hole or a slot for preventing exfoliation of a liquid rubber hardened material, etc. is provided, when a liquid rubber hardened material engages with this engagement part, it becomes possible to prevent that exfoliation.

[0014] As indicated to claim 4, it is preferred for surface roughness of an engagement part wall surface to be referred to as 0.1 micrometer - 100 micrometers for the same reason as a case of above-mentioned claim 2.

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[Embodiment of the Invention] The example of this invention is described according to a drawing below.

[...embodiment of the invention]. The example of this invention is described according to a drawing below.  
[0016]The first example ... Drawing 1 shows the perspective view of the gasket 1 for fuel cells concerning the first example of this invention, and the A-A line enlarged section is shown in drawing 2.

[0017] The gasket 1 for fuel cells concerning the example concerned has the separator 2 which carried out plating treatment of the corrosion-resistant material 4 to up-and-down both sides 3a and 3b of the metallic thin plate (it is also called a substrate) 3 which consists of stainless steel etc. as a metal skin first, respectively. It is fabricated symmetrically, without the seal part 5 of the shape of a lip which consists of the liquid rubber hardened material (it is also only called rubber) 6, respectively using adhesives for up-and-down both sides of this separator 2 that carried out plating treatment.

[0018] Only within this portion, plating treatment is not performed to the part which is located to up-and-down both sides 3a and 3b of the metallic thin plate 3, and fabricates the liquid rubber hardened material 6, but the liquid rubber hardened material 6 is being directly fixed to the metallic thin plate 3, and plating treatment is performed only to the part which does not fabricate the liquid rubber hardened material 6. The surface roughness of the metallic thin plate 3 in the part where the liquid rubber hardened material 6 is fixed directly without performing a plating treatment is about 0.1 micrometer, 100 micrometers or less.

[0019] Since plating treatment is not performed only this portion only within the part which fabricates the liquid rubber hardened material 6 in the metallic thin plate 3 which consists of stainless steel etc. which carried out plating treatment of the corrosion-resisting material 4 to up-and-down both sides 3a and 3b as a metal skin in the gasket 1 of the above-mentioned composition, The base materials (stainless steel etc.) of the metallic thin plate 3 are exposed, and the liquid rubber hardened material 6 is directly fabricated in this portion by this exposed metallic thin plate 3. The surface roughness of this portion is set as the range of 0.1 micrometer - 100 micrometers, and this figure has coarse surface roughness as compared with the metal skin which consists of the corrosion-resisting material 4. Therefore, since the surface roughness of this metallic thin plate 3 is maintained as it is in the portion which the metallic thin plate 3 exposed, it is possible to raise the adhesive property of the metallic thin plate 3 and the liquid rubber hardened material 6. Therefore, even if it does not apply adhesives to the separator 2 thru/or the metallic thin plate 3 which carried out plating treatment, the liquid rubber hardened material 6 can be firmly fixed to the separator 2 thru/or the metallic thin plate 3, and the

[0020]As shown in drawing 3 and drawing 4, the liquid rubber hardened material 6 may be fabricated by only

[0021] The grooved crevice 7 is established in the part which fabricates the liquid rubber hardened material 6 of the metallic thin plate 3 regardless of the case (drawing 5) of double-sided shaping, and the case of one side shaping (drawing 6), and it may be made to fabricate the liquid rubber hardened material 6 so that it may get

[0022] The second example ... While drawing 7 shows the perspective view of the gasket 1 for fuel cells concerning the second example of this invention and the C-C line enlarged section is shown in drawing 8, the

[0023]The gasket 1 for fuel cells concerning the example concerned has the separator 2 which carried out plating treatment of the corrosion-resistant material 4 to up-and-down both sides 3a and 3b of the metallic thin plate (it is also called a substrate) 3 which consists of stainless steel etc. as a metal skin first, respectively. It is fabricated symmetrically, without the seal part 5 of the shape of a lip which consists of the liquid rubber hardened material (it is also only called rubber) 6, respectively using adhesives for up-and-down both sides of this separator 2 that carried out plating treatment.

[0024] Only within this portion, plating treatment is not performed to the part which is located to up-and-down both sides 3a and 3b of the metallic thin plate 3, and fabricates the liquid rubber hardened material 6, but the liquid rubber hardened material 6 is being directly fixed to the metallic thin plate 3, and plating treatment is performed only to the part which does not fabricate the liquid rubber hardened material 6. The surface roughness of the metallic thin plate 3 in the part where the liquid rubber hardened material 6 is fixed directly without performing plating treatment is set as the range of 0.1 micrometer - 100 micrometers.

[0025]Many engagement parts 8 of the shape of a through hole for preventing exfoliation of the liquid rubber hardened material 6 so that the part which fabricates the liquid rubber hardened material 6 of the up-and-down both sides 3a and 3b may be mutually opened for free passage to the metallic thin plate 3 are formed along with the longitudinal direction of the liquid rubber hardened material 6. The liquid rubber hardened material 6A in this engagement part 8 is passed, and integral moulding of the liquid rubber hardened material 6 of the upper and lower sides also with a big twist is carried out mutually. As for this, the surface roughness of the wall surface (internal surface) of the through hole-like engagement part 8 is set as the range of 0.1 micrometer - 100 micrometers.

[0026] Since plating treatment is not performed only this portion only within the part which fabricates the liquid rubber hardened material 6 in the metallic thin plate 3 which consists of stainless steel etc. which carried out plating treatment of the corrosion-resistant material 4 to up-and-down both sides 3a and 3b as a metal skin in the gasket 1 of the above-mentioned composition, The base materials (stainless steel etc.) of the metallic thin plate 3 are exposed, and the liquid rubber hardened material 6 is directly fabricated in this portion by this exposed metallic thin plate 3. The surface roughness of this portion is set as the range of 0.1 micrometer - 100 micrometers, and this figure has coarse surface roughness as compared with the metal skin which consists of the corrosion-resistant material 4. Therefore, since the surface roughness of this metallic thin plate 3 is maintained as it is in the portion which the metallic thin plate 3 exposed, it is possible to raise the adhesive property of the metallic thin plate 3 and the liquid rubber hardened material 6. Since it combines in this gasket 1 and integral moulding of the up-and-down liquid rubber hardened material 6 is mutually carried out via the liquid rubber hardened material 6A in the engagement part 8, It is possible for the liquid rubber hardened material 6 under besides to do so the slip off stop operation from the metallic thin plate 3 mutually, and to prevent exfoliation of the liquid rubber hardened material 6 also from this point therefore. Therefore, even if it does not apply adhesives to the separator 2 thru/or the metallic thin plate 3 which carried out plating treatment, the liquid rubber hardened material 6 can be firmly fixed to the separator 2 thru/or the metallic thin plate 3, and the bonding agent applying process to the separator 2 thru/or the metallic thin plate 3 can be skipped.

the bonding agent applying process to the separate thin plate the module thin plate can be shipped. [0027] As shown in drawing 10, the grooved crevice 7 is established in the part which fabricates the liquid rubber hardened material 6 of the metallic thin plate 3, and it may be made to fabricate the liquid rubber hardened material 6 so that it may get into this crevice 7 exactly.

[0028] The third example ... While drawing 11 shows the perspective view of the gasket 1 for fuel cells concerning the third example of this invention and the E-E line enlarged section is shown in drawing 12, the F-F line enlarged section is shown in drawing 13.

[0029] The gasket 1 for fuel cells concerning the example concerned has the separator 2 which carried out plating treatment of the corrosion-resistant material 4 to up-and-down both sides 3a and 3b of the metallic thin plate (it is also called a substrate) 3 which consists of stainless steel etc. as a metal skin first, respectively. It is fabricated without the seal part 5 of the shape of a lip which consists of the liquid rubber hardened material (it is also only called rubber) 6 using adhesives for one of fields (a figure upper surface) among up-and-down both sides of this separator 2 that carried out plating treatment.

[0030] Only within this portion, plating treatment is not performed to the part which is located to up-and-down both sides 3a and 3b of the metallic thin plate 3, and fabricates the liquid rubber hardened material 6, but the liquid rubber hardened material 6 is being directly fixed to the metallic thin plate 3, and plating treatment is performed only to the part which does not fabricate the liquid rubber hardened material 6. The surface roughness of the metallic thin plate 3 in the part where the liquid rubber hardened material 6 is fixed directly without performing plating treatment is set as the range of 0.1 micrometer - 100 micrometers.

[0031]Many engagement parts 8 of the shape of a through hole for preventing exfoliation of the liquid rubber hardened material 6 are formed in the metallic thin plate 3 along with the longitudinal direction of the liquid rubber hardened material 6. By carrying out integral moulding of the liquid rubber hardened material 6 which makes the above-mentioned seal part 5 to the liquid rubber hardened material 6A in this engagement part 8, the slip off stop of the latter liquid rubber hardened material 6 is carried out from the metallic thin plate 3. The direction below the upper part is greatly formed in the opening sectional area, and, therefore, the through hole-like engagement part 8 does a slip off stop operation so. As for this, the surface roughness of the wall surface (internal surface) of this engagement part 8 is set as the range of 0.1 micrometer - 100 micrometers.

[0032]Since plating treatment is not performed only this portion only within the part which fabricates the liquid rubber hardened material 6 in the metallic thin plate 3 which consists of stainless steel etc. which carried out plating treatment of the corrosion-resistant material 4 to up-and-down both sides 3a and 3b as a metal skin in the gasket 1 of the above-mentioned composition, The base materials (stainless steel etc.) of the metallic thin plate 3 are exposed, and the liquid rubber hardened material 6 is directly fabricated in this portion by this exposed metallic thin plate 3. The surface roughness of this portion is set as the range of 0.1 micrometer - 100 micrometers, and this figure has coarse surface roughness as compared with the metal skin which consists of the corrosion-resistant material 4. Therefore, since the surface roughness of this metallic thin plate 3 is maintained as it is in the portion which the metallic thin plate 3 exposed, it is possible to raise the adhesive property of the metallic thin plate 3 and the liquid rubber hardened material 6. In this gasket 1, since integral moulding of the liquid rubber hardened material 6 is carried out to the liquid rubber hardened material 6A in the engagement part 8, it is possible for this liquid rubber hardened material 6 to do so the slip off stop operation from the metallic thin plate 3, and to prevent exfoliation of the liquid rubber hardened material 6 also from this point therefore. Therefore, even if it does not apply adhesives to the separator 2 thru/or the metallic thin plate 3 which carried out plating treatment, the liquid rubber hardened material 6 can be firmly fixed to the separator 2 thru/or the metallic thin plate 3, and the bonding agent applying process to the separator 2 thru/or the metallic thin plate 3 can be skipped.

[0033]As shown in drawing 14, the grooved crevice 7 is established in the part which fabricates the liquid rubber hardened material 6 of the metallic thin plate 3, and it may be made to fabricate the liquid rubber hardened material 6 so that it may get into this crevice 7 exactly.

Harder  
[0034]

[0034] [Effect of the Invention] This invention does the following effects so

[Effect of the Invention] This invention does the following effects so.  
[0035]Namely, in the gasket for fuel cells by claim 1 or 2 of this invention first provided with the above-mentioned composition, Since the liquid rubber hardened material is directly fabricated by the metallic thin plate, without carrying out plating treatment to the part which is located to both sides of the metallic thin plate which performed plating treatment, and fabricates a liquid rubber hardened material, It is possible by using effectively the surface roughness of the base material of a metallic thin plate to raise the adhesive property of a metallic thin plate and a liquid rubber hardened material. Therefore, even if it does not apply adhesives to the separator which performed plating treatment, a liquid rubber hardened material can be firmly fixed to a separator, therefore the bonding agent applying process to a separator can be skipped, and a manufacturing process can be simplified.

[0036]In the gasket for fuel cells by claim 3 or 4 of this invention provided with the above-mentioned composition, Since the engagement part which becomes the metallic thin plate which performed plating treatment from a through hole or a slot for preventing exfoliation of a liquid rubber hardened material, etc. is provided, when a liquid rubber hardened material engages with this engagement part, it is possible to prevent that exfoliation. Therefore, even if it does not apply adhesives to the separator which performed plating treatment, a liquid rubber hardened material can be firmly fixed to a separator, therefore the bonding agent application can be omitted, and the manufacturing process can be simplified.

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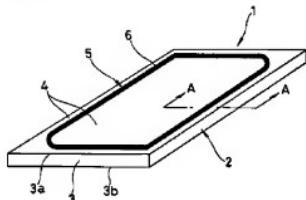
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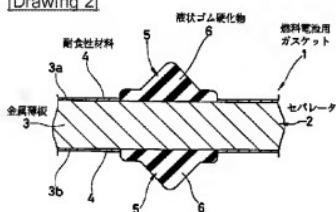
DRAWINGS

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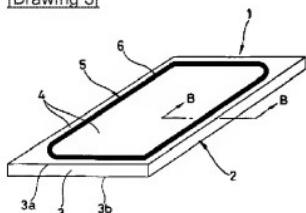
[Drawing 1]



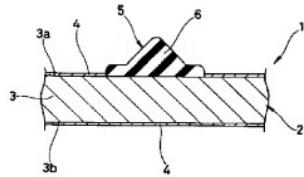
[Drawing 2]



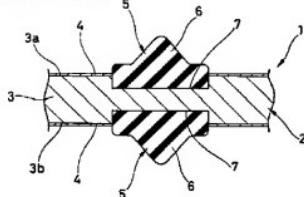
[Drawing 3]



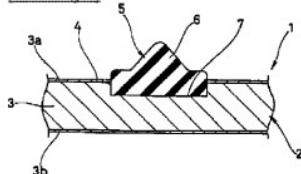
[Drawing 4]



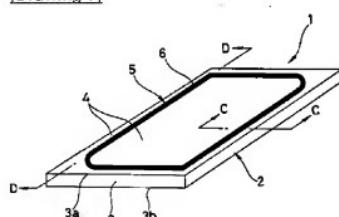
[Drawing 5]



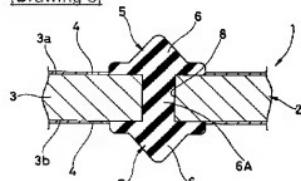
### [Drawing 6]



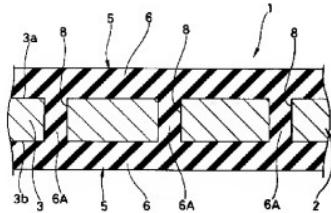
### [Drawing 7]



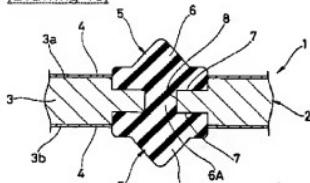
[Drawing 8]



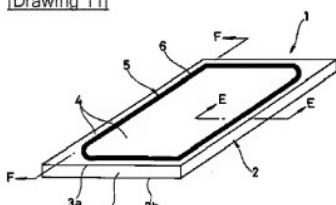
[Drawing 9]



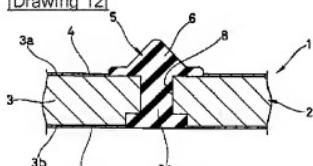
[Drawing 10]



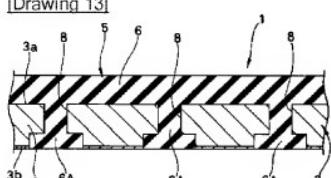
[Drawing 11]



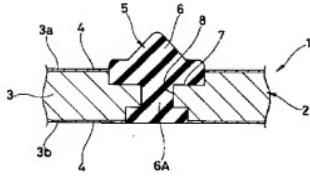
[Drawing 12]



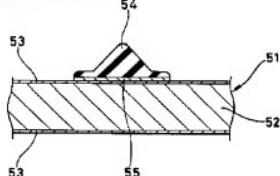
[Drawing 13]



[Drawing 14]



[Drawing 15]



[Translation done.]